LASER PEENING

TO GIVE METAL MORE MIGHT

Laser peening induces deep compressive stress, which significantly extends the service lifetime over any conventional treatment.

Peening is a long used process in metal work. The well known form uses a ball-peen hammer to pound a piece of metal into shape and strengthen it against fatigue failure. For the last 50 years the industrial equivalent has been shot peening — metal or ceramic beads as large as marbles or as small as grains of salt and pepper pneumatically bombarding a metal surface.

Laser peening, a process based on superior laser technology at Lawrence Livermore National Laboratory, replaces hammer blows or beads with short blasts of intense laser light, creating an intense shock wave that peens the metal. The laser process puts compressive stress much deeper into the metal, significantly increasing resistance to cracking or corrosion.

Uses for laser peening have been developed in the aircraft and aerospace industries and are rapidly following for automotive, medical and nuclear applications. Metal Improvement Company's facilities in Livermore, Calif. and Earby, United Kingdom, are currently using this technology to strengthen the fatigue life of jet engine fan blades and discs.

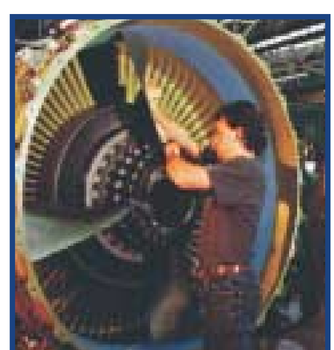
Laser peening extends the lifecycle of each fan blade. The extended life of the fan blades is expected in the long term to save the airline industry hundreds of millions of dollars in replacement parts and maintenance from the production done just this year alone.

Laser peening technology is a spinoff of high-energy lasers developed in the Laboratory's Inertial Confinement Fusion Program and high-power laser work funded at the Lab by the Department of Defense. The Laboratory and Metal Improvement Company, Inc. have won four prestigious R&D 100 awards for their laser peening process.

How it works

The Lasershot Peening System uses a solid-state, high-energy (25-joule/pulse) neodymium-doped glass laser, which pulses at a rate 20 times faster than other available systems and can peen up to 1 square meter of metal per hour.

With each pulse of the laser, an intense shock wave is created over a roughly 5-millimeter-by-5-millimeter area and drives in a residual compressive stress about 1 to 2 millimeters deep into metal. In conventional peening, this compressive layer is only about 0.25 millimeters deep. The added depth enables laser peening to more effectively keep cracks from propagating and significantly extends the life of parts over non-peened or conventionally peened components.



Jet engine fan blades are currently being treated by laser peening.

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